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EP 1033207 A2 DE 029608200 U1
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US 5709596 A US 1871674 A

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(54) Abstract Title
Palm sander with strap

(57) An orbital palm sander comprises a substantially ellipsiod palm receiving surface 13 and a strap 25 which extends over this surface 13 and is rotatably attached to the sander at two attachment points 7a and 7b. The attachment points 7a and 7b are respectively adjacent the user's thumb and little finger when the sander is grasped for use. Also when the sander is in use, the strap 25 extends across the width of the back of the user's hand. The strap 25 is adjustable in length either by being formed from a plurality of sections joined together (Fig. 1) or by being formed from a single strip fixedly attached to a first attachment point 7a which is looped through an opposite attachment point 7b and is folded back on itself. An on/off switch 19 is located on a minor axis of the ellipsiod. The sander also comprises vents 20 for drawing in air and a plugged aperture 27 for the attachment of a vacuum hose.

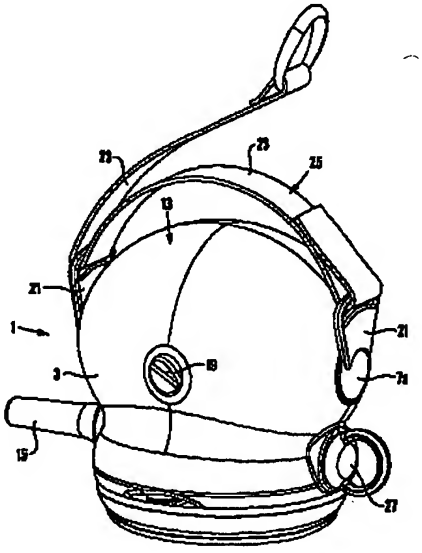

Fig.2

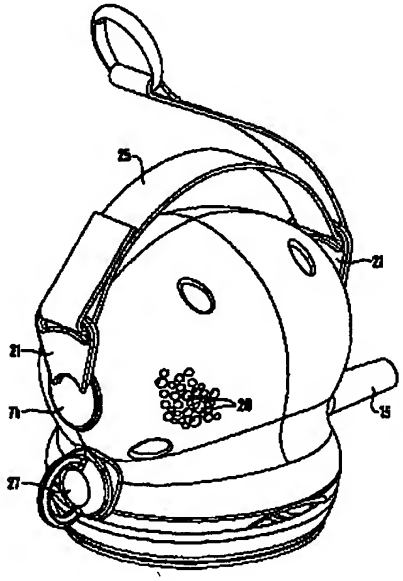

Fig.3

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply

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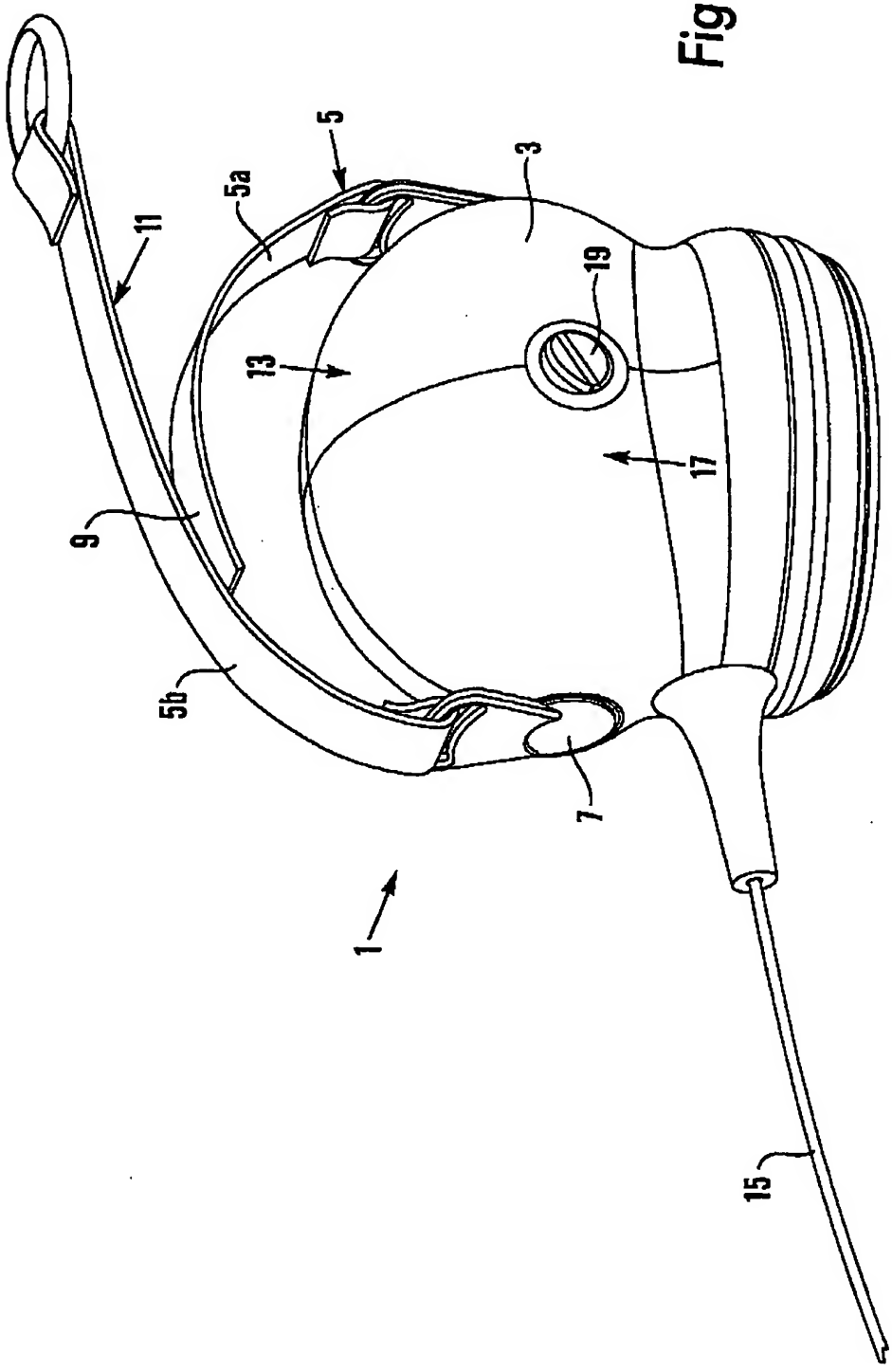

Fig. 1

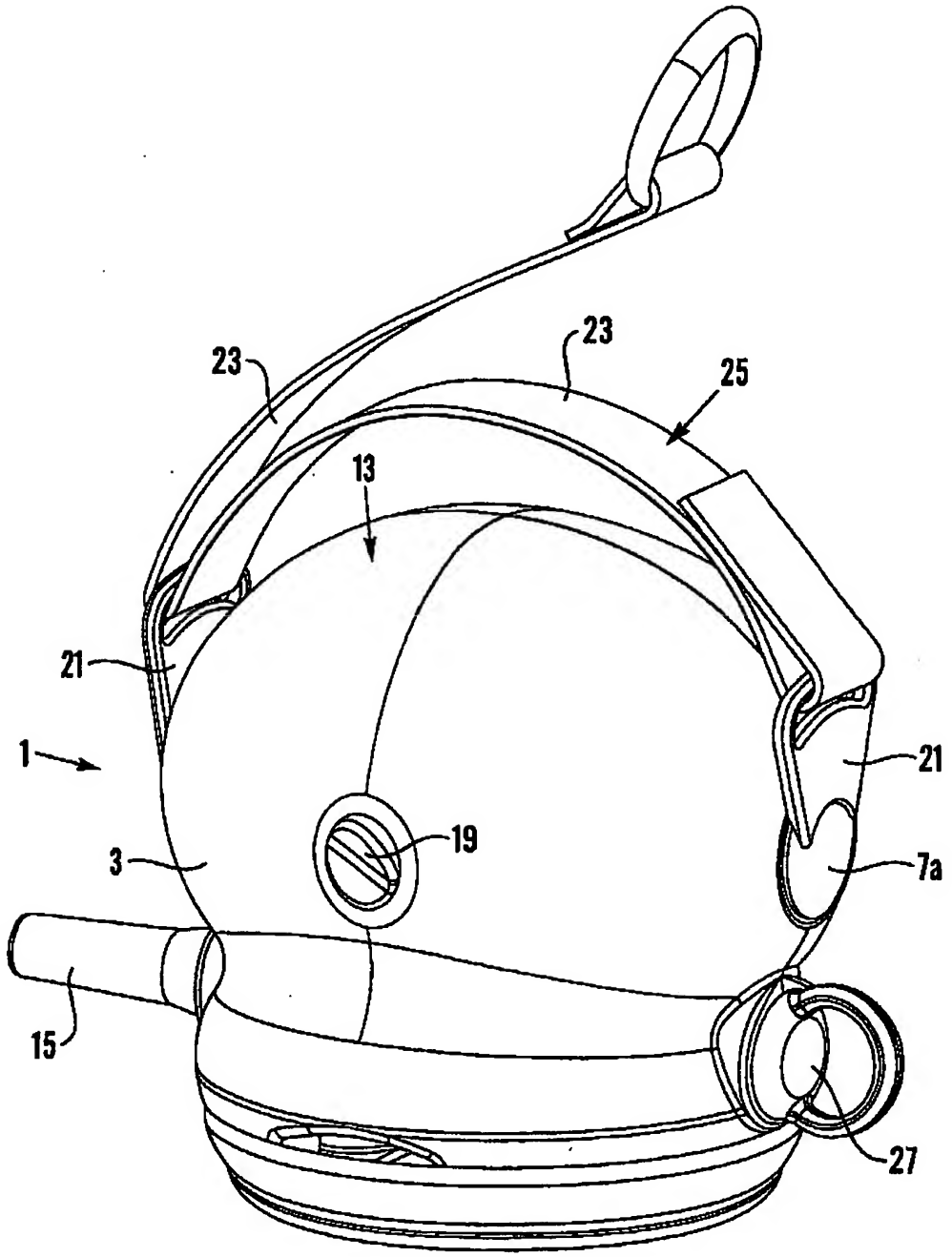

Fig.2

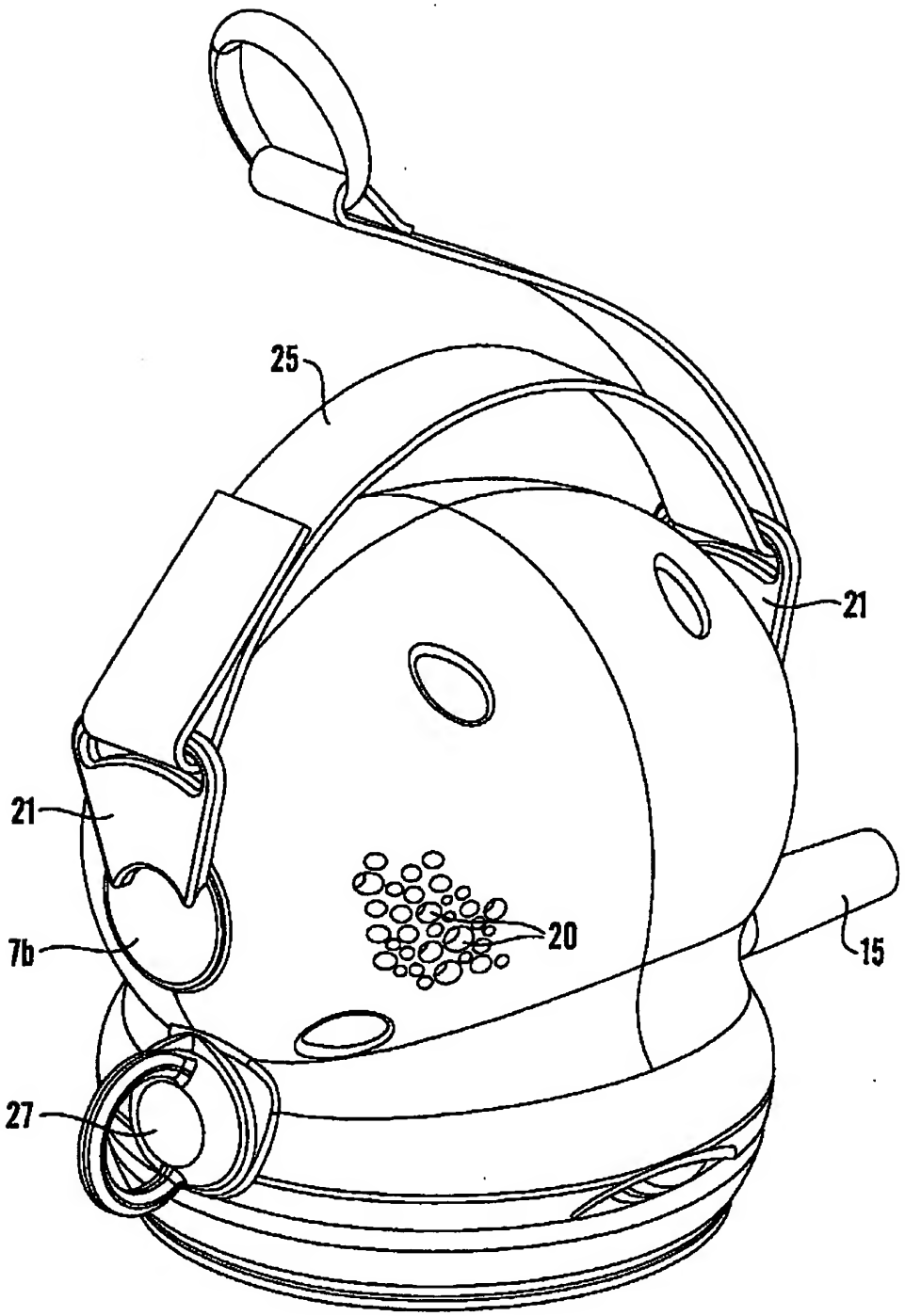

Fig.3

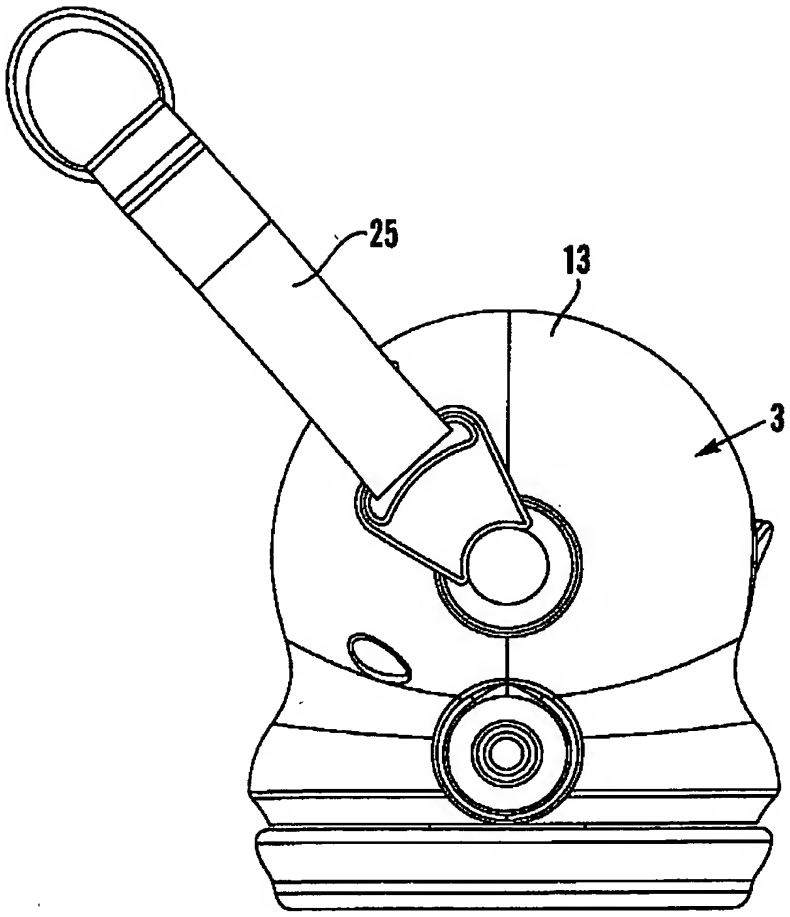

Fig.4

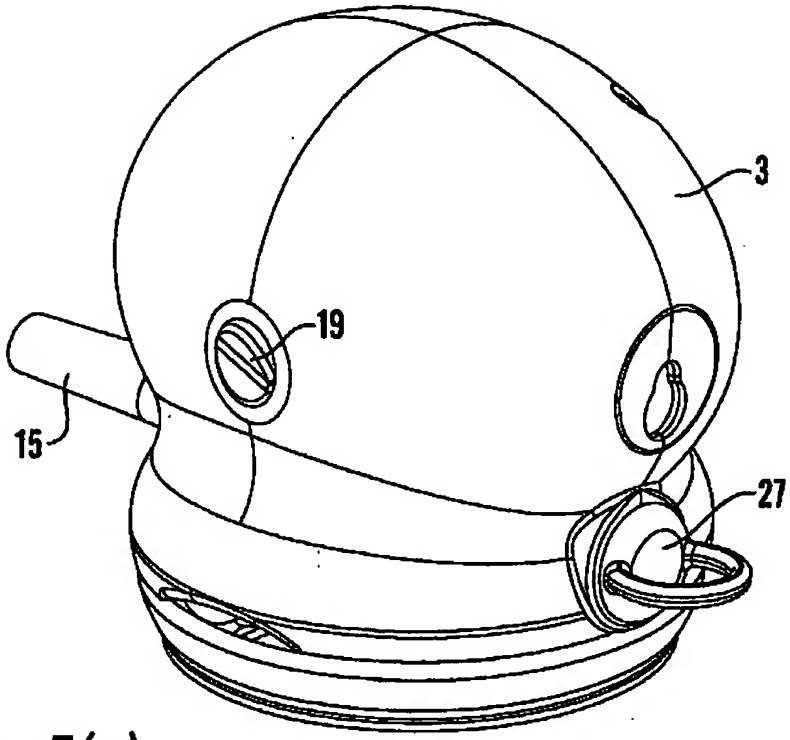

Fig.5(a)

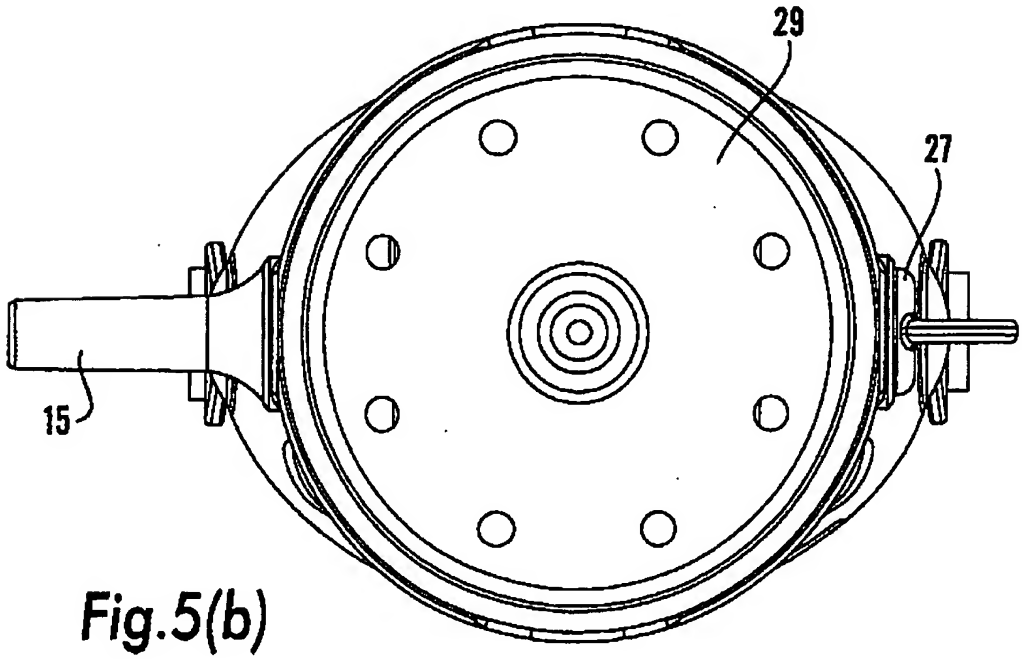

Fig.5(b)

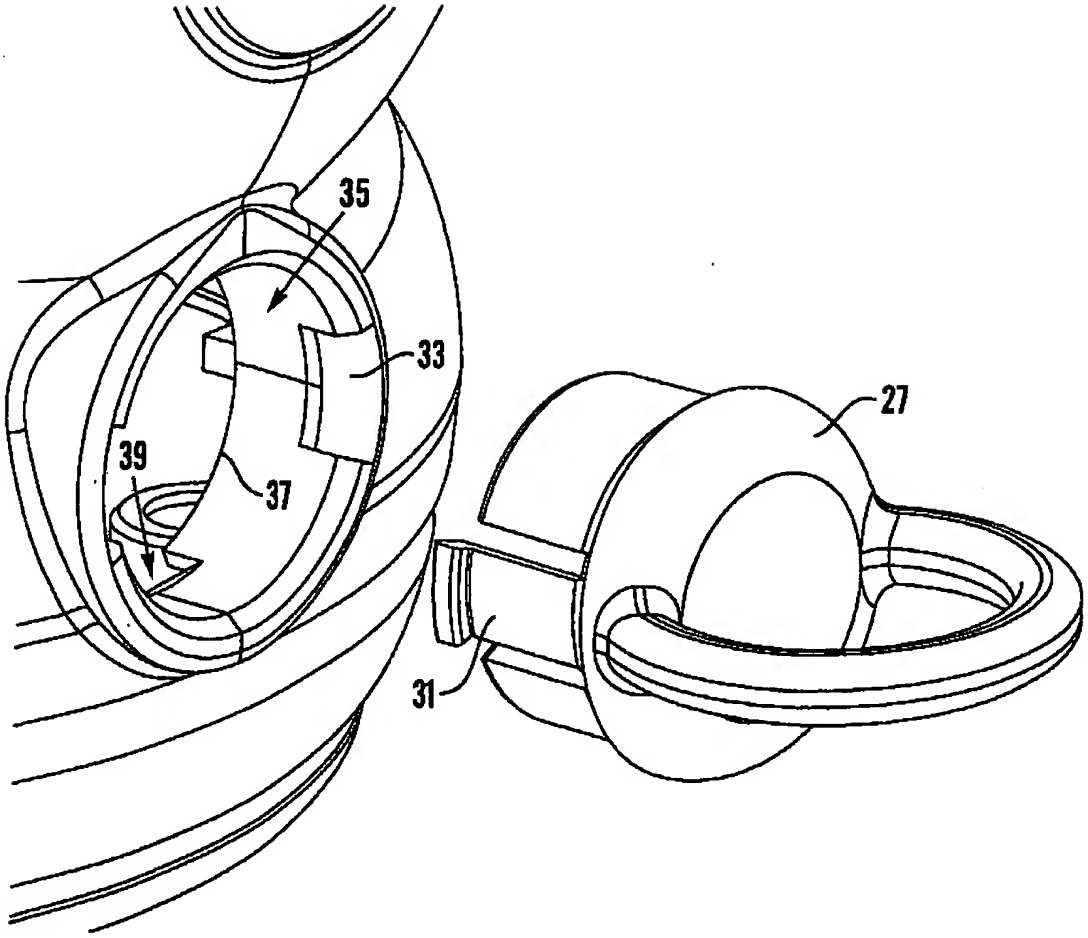

Fig.6

Sander

The present invention relates to a powered sander, for example for use by carpenters/builders/decorators or persons carrying out do-it-yourself home improvement.

According to a first aspect, the invention comprises a hand-held powered sander comprising: (a) a main body arranged to be held in the palm of the hand of a user; and (b) a strap attached, at least in use, to the main body at at least one attachment point and arranged to extend across at least part of the width of the back of the user's hand.

Preferably the strap has a length sufficient to extend across the entirety of the width of the back of the user's hand.

More preferably, the strap is attached, at least in use, to the main body of the sander at at least two spaced-apart attachment points, preferably so that the hand is encircled by the strap extending across the back of the hand and the main body part held in the palm of the hand. Preferably, in use, one of the attachment points is situated adjacent to one edge of the hand (e.g. adjacent to the thumb) and the other attachment point is situated adjacent to the other edge of the hand (e.g. adjacent to the little finger).

Preferably the strap is flexible. Preferred materials for the material of the strap include polymeric materials (including rubber, for example); woven fabrics (including webbing, for example); and the like. In alternative embodiments of the invention, the strap may be substantially rigid, for example formed from a substantially rigid polymer material and/or metal and/or wood.

Advantageously, the strap may be adjustable in length. This has the advantage of enabling the strap to be tightened (to the desired degree) around the back of the hand. It may also facilitate insertion of the hand under the strap

and/or removal of the hand from under the strap, for example. The strap may consequently be formed from two (or more) sections joined or joinable together. A particularly preferred manner of making the strap adjustable in length is by incorporating loop-and-hook joining strips (e.g. VELCRO – trade mark) on opposing surfaces of two or more sections of the strap. Additionally or alternatively the strap may include an adjustable buckle or the like.

Preferably, in use, the strap forms a tight fight (preferably of the desired tightness according to the user's comfort) across the back of the user's hand. Advantageously the tightness or looseness of the strap may be determined by means of the length of the strap being adjusted by the user.

In preferred embodiments of the invention the strap is rotatably attached to the main body of the sander. For example, in embodiments of the invention in which the strap is attached to the main body at two spaced apart attachment points, the strap may be rotatably attached to the main body about an axis extending through both attachment points. This has the advantage of enabling the user to position the strap in a comfortable position across the back of the hand. It may also facilitate insertion of the user's hand under the strap and/or removal of the hand from under the strap. The rotatability of the strap with respect to the main body preferably enables the angle of the hand and/or arm of the user with respect to the main body to be varied during use, thereby enabling the sander to be used at a variety of angles (for example in order to sand awkward to reach surfaces).

The main body of the sander preferably comprises a palm-receiving surface across which the strap extends. The palm-receiving surface is preferably convex in shape or otherwise contoured to fit comfortably and conveniently in the palm of a user's hand.

The strap preferably enables the user to hold and use the sander in comfort and safety for prolonged periods. In particular, the strap preferably

enables the user to hold the sander firmly substantially without needing to grip tightly the main body of the sander in the palm of the hand.

The sander preferably is sized and shaped to facilitate its use by the elderly or disabled, for example.

The main body preferably includes, at least in use, powered abrasive means situated on an opposite surface of the main body to the palm-receiving surface. The powered abrasive means preferably comprises a mount which is movable with respect to the main body of the sander and to which may be attached an abrasive element, for example sand paper, glass paper, emery paper, carborundum paper or the like. The abrasive element need not be based upon paper or card etc – substantially any abrasive means may be used. The abrasive element need not be attachable and detachable to the movable mount – it may be an integral part of the sander – but preferably the abrasive element is replaceable. Most preferably, however, the abrasive element is attachable to the movable mount by means of loop-and-hook joining pads (e.g. VELCRO- trade mark).

The main body of the sander preferably includes a motor which drives the movement of the abrasive means with respect to the main body, in use. The motor is preferably an electric motor. The electric motor may be mains electricity and/or battery powered. In the latter case the main body preferably includes a battery storage cavity.

The abrasive means may move with respect to the main body of the sander in substantially any suitable way to effect the desired sanding or abrading action. For example, the abrasive means may rotate (driven by the motor) with respect to the main body. More preferably, however, the sander is an orbital sander, and the movement of the abrasive means with respect to the main body is an orbital movement. This may be achieved, for example, by the abrasive means (preferably an abrasive element attached to a movable mount)

being driven by the motor by means of an off-centre (or eccentric) shaft on which the abrasive means is mounted. The abrasive means is preferably attached to one or more flexible retaining members, and the combination of the off-centre shaft and the flexible retaining members cause the abrasive means to adopted a so-called orbital motion with respect to the main body of the sander.

The main body of the sander preferably includes an on/off switch (and/or sanding speed adjust control) situated for convenience on a side surface of the main body part. Advantageously, switches and/or controls may be situated on two opposite side surfaces of the main body, for example symmetrically, in order to facilitate left and right-handed use.

Preferably the strap is detachable and replaceable. Advantageously, in preferred embodiments the strap may be attached to the main body of the sander in either of two opposite orientations. This may facilitate adjustment of the length of the strap for example by, respectively, right-handed and left-handed users.

The invention will now be described, by way of example, with reference to the accompanying drawings, of which:

Figure 1 shows, schematically, a first embodiment of a sander according to the invention;

Figures 2 to 5 show, schematically, several views of a second embodiment of a sander according to the invention; and

Figure 6 shows a detail of the second embodiment of the invention.

Figure 1 shows a hand-held powered sander 1 according to the invention, comprising: (a) a main body 3 arranged to be held in the palm of the hand of a user; and (b) a strap 5 attached to the main body at two spaced-apart

attachment points 7 (one of which is shown and the other is hidden from view) and arranged to extend across the width of the back of the user's hand (not shown).

The strap 5 is adjustable in length; it is formed from two sections 5a and 5b joinable together by means of loop-and-hook joining strips (e.g. VELCRO – trade mark) on opposing surfaces 9 and 11 of the two sections of the strap. In use, the strap may form a tight fight (preferably of the desired tightness according to the user's comfort) across the back of the user's hand by means of the length of the strap being adjusted by the user.

The main body has a convex curved, contoured external shape, to facilitate being held in the palm of one hand. An upper surface (as illustrated) 13 of the main body is a convex palm-receiving surface. On the opposite, underside (as illustrated) of the main body is abrasive means (not shown) – i.e. a movable abrasive element which carries out the sanding action.

The main body contains an electrical motor which is powered by mains electricity – a power cord 15 is shown.

Each of the two opposite side surfaces 17 includes an on/off switch 19 – the sander is symmetrical for use in the left or right hand.

Figure 2 shows the first of several views of a second preferred embodiment of sander according to the invention. The sander 1 comprises a main body 3 having a convex palm-receiving surface 13 of generally ellipsoid shape arranged to be held in the palm of the hand of a user. A strap 25 is attached to the main body 3 at two spaced-apart attachment points 7 which are located generally on the major axis of the ellipsoid. Removable attachment members 21 attach the strap to the main body.

The strap 25 comprises a single continuous strip which is fixedly attached to a first attachment point 7a, extends across the palm-receiving surface 13 and is looped through the opposite attachment point 7b and folded back on itself. Surface 23 of the strap 25 has suitably located loop-and-hook joining strips (e.g. VELCRO – trade mark) – not shown – by which the folded back portion 25b of the strap 25 may be attached to the main portion 25a of the strap, and by which the length of the main portion of the strap between the attachment points may be adjusted.

The attachment points 7a and 7b may be detached from the main body as shown in Figure 5(a). The orientation of strap 25 may be reversed to suit ease of adjustment for left or right handed users.

Also shown in Figure 2 is an on/off switch 19 for the sander located symmetrically on a minor axis of the ellipsoid of the main body so that it is actuatable by the user's thumb irrespective of whether the user is right handed or left handed. A power cord 15 is shown extending adjacent and below attachment point 7b. On the opposite of the main body, adjacent and below attachment point 7a, is a removable plug 27. When the plug 27 is removed (see Figure 6) it provides an aperture for the attachment of a vacuum hose for the removal of debris from within the sander due to the sanding process.

Figure 3 shows a reverse view of the sander shown in Figure 2. Air vents 20 are shown – air may be drawn into the main body via these vents when a vacuum hose is attached to aperture 35 and actuated in use.

Figure 4 shows an end view of the sander of Figures 2 and 3, illustrating the fact that the attachment points enable rotational movement of the strap about the major axis of the main body ellipsoid, thereby enabling the position of the user's hand and/or wrist with respect to the main body to be varied.

As previously mentioned, Figure 5(a) shows the sander with the strap and attachment points removed.

Figure 5(b) shows the underside of the sander – the movable mount 29 to which the abrasive element may be attached, is shown.

Figure 6 shows a detail of the removable plug 27 referred to above. The plug includes a pair of resiliently flexible detents 31 which are arranged to be received by recesses 33 in the aperture 35. The recesses 33 enable the plug to be pushed (substantially without rotation) fully into the aperture so that the detents 31 of the plug engage on a rim 37 at the interior of the aperture. The plug is thereby prevented from being removed from the aperture until it is rotated through 90° and the plug detents 31 engage with recesses 39 in the rear rim 37 of the aperture, which enable the plug to be withdrawn from the aperture (substantially without further rotation).

Claims

1. A hand-held powered sander comprising:
   (a) a main body arranged to be held in the palm of the hand of a user; and
   (b) a strap attached, at least in use, to the main body at at least one attachment point and arranged to extend across at least part of the width of the back of the user's hand.

2. A sander according to Claim 1, in which the strap has a length sufficient to extend across the entirety of the width of the back of a user's hand.

3. A sander according to Claim 1 or Claim 2, in which the strap is attached, at least in use, to the main body of the sander at at least two spaced-apart attachment points.

4. A sander according to Claim 3, in which one of the attachment points is situated such that in use it is adjacent to the thumb of the user's hand, and the other attachment point is situated such that in use it is adjacent to the little finger of the user's hand.

5. A sander according to any preceding claim, in which the strap is flexible.

6. A sander according to any preceding claim, in which the strap is adjustable in length.

7. A sander according to Claim 6, in which the strap is formed from two or more sections joined or joinable together.

8. A sander according to Claim 6, in which the strap comprises a single continuous strip which is fixedly attached to a first attachment point,

extends across the main body, is looped through an opposite attachment point and is folded back on itself.

9. A sander according to any preceding claim, in which the strap is rotatably attached to the main body.

10. A sander according to Claim 9 when dependent upon Claim 3, in which the strap is rotatably attached to the main body about an axis extending through both attachment points.

11. A sander according to any preceding claim, in which the main body comprises a palm-receiving surface across which the strap extends.

12. A sander according to Claim 11, in which the palm-receiving surface is convex in shape or otherwise contoured to fit comfortably and conveniently in the palm of a user's hand.

13. A sander according to Claim 11 or Claim 12, in which the palm-receiving surface is generally ellipsoid in shape.

14. A sander according to Claim 13, further comprising a control switch for the sander located symmetrically on a minor axis of the ellipsoid of the main body.

15. A sander according to Claim 11 or any claim dependent thereon, in which the main body includes, at least in use, powered abrasive means situated on an opposite surface of the main body to the palm-receiving surface.

16. A sander according to Claim 15, in which the powered abrasive means comprises a mount which is movable with respect to the main body of the sander and to which may be attached an abrasive element.

17. A sander according to Claim 15 or Claim 16, in which the main body includes a motor which drives the movement of the abrasive means with respect to the main body, in use.

18. A sander according to any one of claims 15 to 17, in which the sander is an orbital sander, and the movement of the abrasive means with respect to the main body is an orbital movement.

19. A sander according to any preceding claim, in which the main body further comprises air vents via which air may be drawn into the main body, in use.

20. A sander according to any preceding claim, in which the main body includes an aperture for the attachment of a vacuum hose.

21. A sander according to Claim 20, in which the aperture contains a removable plug, the plug including a pair of resiliently flexible detents which are arranged to be received in recesses in the aperture.

22. A sander according to Claim 21, in which the recesses enable the plug to be pushed substantially without rotation fully into the aperture so that the detents of the plug engage on a rim at the interior of the aperture.

23. A sander according to Claim 22, in which the plug is prevented from being removed from the aperture until it is rotated and the plug detents engage with further recesses, in the rear rim of the aperture, which enable the plug to be withdrawn from the aperture substantially without further rotation.

24. A sander substantially as hereinbefore described with reference to the accompanying drawings.

25. A sander substantially as shown in the accompanying drawings.

12

Application No:	GB 0124206.4	**Examiner:**	Matthew Lawson
Claims searched:	1-25	**Date of search:**	29 January 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1-13,19	US 1871674	(ELLITHORPE) - the whole specification, especially figures 1-3.
X	1-5,9,11, 12,15-17	DE 4119325 A1	(LICENTIA) - WPI Abstract Accession No. 92-425026/52 and the figures.
X	1-3,5-12, 19	EP 1033207 A2	(C & E) - WPI Abstract Accession No. 00-566809/53 and figures 1 & 2.
X	1 at least	DE 4240336 A1	(RAINER) - WPI Abstract Accession No. 94-192386/24 and the figures.
X	1 at least	DE 29608200 U1	(STENDERS) - WPI Abstract Accession No. 96-385650/39 and the figure.
A		US 5709596	(ALEXANDER) - the figures.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

Worldwide search of patent documents classified in the following areas of the IPC[7]:

B24B; B25F

The following online and other databases have been used in the preparation of this search report:

Online: PAJ, WPI